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(54) **System disconnector**

(57) System disconnector (10) comprising: a housing (11) defining an inlet chamber (12), an outlet chamber (13) and an intermediate chamber (14) positioned in flow direction of a liquid medium between the inlet chamber (12) and the outlet chamber (13); backflow preventers (15, 16) arranged in series connection in the flow of the liquid medium, namely a first backflow preventer (15) between the inlet chamber (12) and the intermediate chamber (14) and a second backflow preventer (16) between the intermediate chamber (14) and the outlet chamber (13); a discharge valve (17) adapted to discharge the intermediate chamber (14) being positioned between the first backflow preventer (15) and the second backflow preventer (16) to the atmosphere which is controlled by a pressure differential between the inlet chamber (12) and the intermediate chamber (14). The discharge valve (17) is provided by a moveable housing insert (18) in combination with a non-moveable housing insert (19), wherein the moveable housing insert (18) is part of the first backflow preventer (15), wherein the non-moveable housing insert (19) is part of the second backflow preventer (16), wherein the discharge valve (17) is closed when the moveable housing insert (18) is pressed against the non-moveable housing insert (19), and wherein the discharge valve (17) is opened when the moveable housing insert (18) is lifted up from the non-moveable housing insert (19).

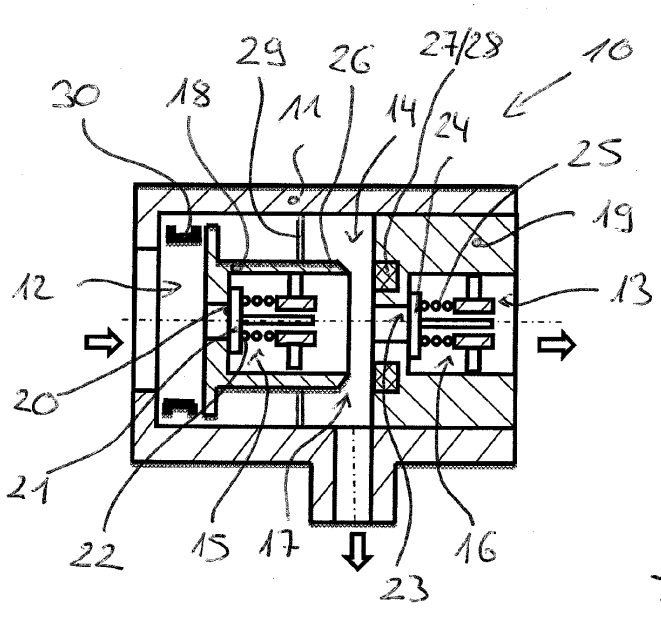

Fig 1a

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Description

[0001] The invention relates to a system disconnector especially for drinking water installations according to the preamble of claims 1, 6 or 9.

[0002] EP 0 555 837 B1 discloses a system disconnector for drinking water installations. The known system disconnector comprises a housing defining an inlet chamber, an outlet chamber and an intermediate chamber positioned in flow direction of a liquid medium between the inlet chamber and the outlet chamber. Further on, the system disconnector comprises backflow preventers arranged in series connection in the flow of the liquid medium, namely a first backflow preventer between the inlet chamber and the intermediate chamber and a second backflow preventer between the intermediate chamber and the outlet chamber. The known system disconnector further comprises a discharge valve being adapted to discharge the intermediate chamber being positioned between the first backflow preventer and the second backflow preventer to the atmosphere which is controlled by a pressure differential between the inlet chamber and the intermediate chamber. The discharge valve is also often called venting valve. The discharge valve of the known system disconnecter comprises a vale stem carrying a valve body, a valve seat provided by the housing, a diaphragm and a spring. This results in a relative complex design of the system disconnector. Further on, system disconnectors known from the prior art usually have leakage problems after a long storage of the same. In order to avoid leakage, the discharge valve needs to be closed before the first backflow preventer opens.

[0003] Against this background, novel system disconnectors are provided having a more simple design avoiding leakage problems.

[0004] According to a first aspect of the present invention, the discharge valve is provided by a moveable housing insert in combination with a non-moveable housing insert, wherein the moveable housing insert is part of the first backflow preventer, wherein the non-moveable housing insert is part of the second backflow preventer, wherein the discharge valve is closed when the moveable housing insert is pressed against the non-moveable housing insert, and wherein the discharge valve is opened when the moveable housing insert is lifted up from the non-moveable housing insert. Such a system disconnector has a simple design and avoids leakage problems.

[0005] According to a second aspect of the present invention, the discharge valve is provided by an elastic element being positioned between an inner housing part of the housing and an outer housing part of the housing, wherein the inner housing part is part of the first backflow preventer and the second backflow preventer, wherein the discharge valve is closed when the elastic element is stretched, and wherein the discharge valve is opened when the elastic element is un-stretched. Such a system disconnector has a simple design and avoids leakage problems.

[0006] According to a third aspect of the present invention, the discharge valve is provided by a first moveable housing insert, and the first backflow preventer is provided by the first moveable housing insert in combination with a second moveable housing insert, wherein the discharge valve is closed when the first moveable housing insert is pressed against the housing. Such a system disconnector has a simple design and avoids leakage problems.

[0007] Preferred developments of the invention are provided by the dependent claims and the description which follows. Exemplary embodiments are explained in more detail on the basis of the drawing, in which:

Figure 1 a and 1 b	each show a cross sectional view through system disconnector especially for drinking water installations according to a first aspect of the invention;
Figures 2a and 2b	each show a cross sectional view through system disconnector especially for drinking water installations according to a second aspect of the invention;
Figures 3a and 3b	each show a cross sectional view through system disconnector especially for drinking water installations according to a third aspect of the invention.

[0008] The invention relates to a system disconnector especially for drinking water installations.

[0009] Figures 1a and 1b show a system disconnector 10 according to a first aspect of the present invention. The system disconnector 10 comprises a housing 11 defining an inlet chamber 12, an outlet chamber 13 and an intermediate chamber 14 positioned in flow direction of a liquid medium, especially of drinking water, between the inlet chamber 12 and the outlet chamber 13.

[0010] The system disconnector 10 further comprises backflow preventers 15, 16 arranged in series connection in the flow of the liquid medium, namely a first backflow preventer 15 between the inlet chamber 12 and the intermediate chamber 14 and a second backflow preventer 16 between the intermediate chamber 14 and the outlet chamber 13.

[0011] When the first backflow preventer 15 is opened, the liquid medium can flow from the inlet chamber 12 into the intermediate chamber 14. The opening and closing of the first backflow preventer 15 is controlled by a pressure differential between the inlet chamber 12 and the intermediate chamber 14.

[0012] When the second backflow preventer 16 is opened, the liquid medium can flow from the intermediate chamber 14 in the outlet chamber 13. The opening and closing of the second backflow preventer 16 is controlled by a pressure differential between the intermediate chamber 14 and the outlet chamber 13.

[0013] The system disconnector 10 further comprises a discharge valve 17 adapted to discharge the intermediate chamber 14 being positioned between the first backflow preventer 15 and the second backflow preventer 16 to the atmosphere. The discharge of the intermediate chamber 14 by the discharge valve 17 is controlled by a pressure differential between the inlet chamber 12 and the intermediate chamber 14. The discharge valve 17 is also often called venting valve. In Figure 1a the discharge valve 17 is opened and in Figure 1b the discharge valve 17 is closed.

[0014] The discharge valve 17 of the disconnect protector 10 according to Figures 1a and 1b is provided by a moveable housing insert 18 in combination with a non-moveable housing insert 19.

[0015] The moveable housing insert 18 is part of, especially accommodates, the first backflow preventer 15. The first backflow preventer 15 is positioned within an opening of the moveable housing part 18. The non-moveable housing insert 19 is part of, especially accommodates, the second backflow preventer 13. The second backflow preventer 16 is positioned within an opening of the non-moveable housing part 19.

[0016] The discharge valve 17 is closed (see Figure 1 b) when the moveable housing insert 18 is pressed against the non-moveable housing insert 19. The discharge valve 17 is opened (see Figure 1 a) when the moveable housing insert 18 is lifted up from the non-moveable housing insert 19.

[0017] The moveable housing insert 18 accommodating the first backflow preventer 15 provides a valve seat 20 for a valve body 21 of the first backflow preventer 15, whereby a spring force provided by a spring element 22 of the first backflow preventer 15 tends to press the valve body 21 against the valve seat 20. An increasing pressure within the inlet chamber 12 tends to lift up the valve body 21 from the valve seat 20 against the spring force provided by the spring element 22.

[0018] The non-moveable housing insert 19 accommodating the second backflow preventer 16 provides a valve seat 23 for a valve body 24 of the second backflow preventer 16, whereby a spring force provided by a spring element 25 of the second backflow preventer 16 tends to press the valve body 24 against the valve seat 23. An increasing pressure within the intermediate chamber 14 tends to lift up the valve body 24 from the valve seat 23 against the spring force provided by the spring element 25.

[0019] The moveable housing insert 18 accommodating the first backflow preventer 15 further provides a valve body 26 for the discharge valve 17. The non-moveable housing insert 19 accommodating the second backflow preventer 16 further provides a valve seat 27 for the discharge valve 17.

[0020] Sections 28 of the non-moveable housing insert 19 made from an elastic material provide the valve seat 27 for the valve body 26 of the discharge valve 17. As mentioned above, the valve body 26 of the discharge valve 17 is provided by the moveable housing insert 18.

[0021] A cylinder-like element 30 being made from an elastic material is positioned between housing 11 and the moveable housing insert 18 and separates the inlet chamber 12 from the intermediate chamber 14. The elastic, cylinder-like element 30 is with a first end fixedly attached to the moveable housing insert 18 and with a second end fixedly attached to the housing 11.

[0022] The elastic, cylinder-like element 30 is stretched when the moveable housing insert 18 is pressed against the non-moveable housing insert 19 for closing the discharge valve 17.

[0023] The cylinder-like element 30 is un-stretched when the discharge valve 17 is opened and when the moveable housing insert 18 is lifted up from the non-moveable housing insert 19.

[0024] An increasing pressure within the inlet chamber 12 tends to press the moveable housing insert 18 against the non-moveable housing insert 19 in order to close the discharge valve 17 against an elastic reset force of the elastic, cylinder-like element 30. The elastic reset force of the elastic, cylinder-like element 30 tends to open the discharge valve 17 by lifting up the moveable housing insert 18 from the non-moveable housing insert 19.

[0025] The elastic, cylinder-like element 30 is preferably made from rubber material or a rubber-like material. The material from which the cylinder-like element 30 is made allows an elastic stretching of the cylinder-like element 30 and provides the elastic rest force.

[0026] The system disconnector 10 preferably comprises a guide element 29 for guiding the movement of the moveable housing insert 18 relative to the non-moveable housing insert 19. This guide element 29 is positioned within the intermediate chamber 14 and allows the liquid medium to flow through the same.

[0027] The first backflow preventer 15 can only be opened by an increasing pressure in the inlet chamber 12 when the discharge valve 17 is closed. This is accomplished by adapting the elastic reset force of cylinder-like element 30 and the spring force of the spring element 22 is such a way that the valve body 21 of the first backflow preventer 15 can only lift up from the valve seat 20 of the first backflow preventer 15 after the valve body 26 of the discharge valve 17 provided by the moveable housing insert 18 is pressed against the valve seat 27 of the discharge valve 17 provided by the non-moveable housing 19.

[0028] The system disconnector 10 of Figures 1 a and 1 b has a simple design. The discharge valve 17 does not have a separate spring element. The elasticity of the cylinder-like element 30 allows not to have a separate spring element for the discharge valve 17. The system disconnector 10 of Figures 1 a and 1 b avoids leakage problems.

[0029] Figures 2a and 2b show a system disconnector 110 according to a second aspect of the present invention.

The system disconnector 110 comprises a housing 111 defining an inlet chamber 112, an outlet chamber 113 and an intermediate chamber 114 positioned in flow direction of a liquid medium between the inlet chamber 112 and the outlet chamber 113.

[0030] The system disconnector 110 further comprises backflow preventers 115, 116 arranged in series connection in the flow of the liquid medium, namely a first backflow preventer 115 between the inlet chamber 112 and the intermediate chamber 114 and a second backflow preventer 116 between the intermediate chamber 114 and the outlet chamber 113.

[0031] When the first backflow preventer 115 is opened, the liquid medium can flow from the inlet chamber 112 into the intermediate chamber 114. The opening and closing of the first backflow preventer 115 is controlled by a pressure differential between the inlet chamber 112 and the intermediate chamber 114.

[0032] When the second backflow preventer 116 is opened, the liquid medium can flow from the intermediate chamber 114 in the outlet chamber 113. The opening and closing of the second backflow preventer 116 is controlled by a pressure differential between the intermediate chamber 114 and the outlet chamber 113.

[0033] The system disconnector 110 further comprises a discharge valve 117 adapted to discharge the intermediate chamber 114 being positioned between the first backflow preventer 115 and the second backflow preventer 116 to the atmosphere. The discharge of the intermediate chamber 114 by the discharge valve 117 is controlled by a pressure differential between the inlet chamber 112 and the intermediate chamber 114. The discharge valve 117 is also often called venting valve. In Figure 2a the discharge valve 117 is opened and in Figure 2b the discharge valve 117 is closed.

[0034] The discharge valve 117 of the disconnect protector 110 according to Figures 2a and 2b is provided by an elastic element 118. The elastic element 118 is positioned between an inner housing part 119 of the housing 111 and an outer housing part 120 of the housing 111.

[0035] The inner housing part 119 is part of, especially accommodates, the first backflow preventer 115 and the second backflow preventer 116. The inner housing part 119 accommodating the first backflow preventer 115 and the second backflow preventer 116 provides for both back flow preventers 115, 116 a valve seat 120, 121 for a valve body 122, 123 of the respective backflow preventer 115, 116, whereby a spring force provided by a spring element 124, 125 of the respective backflow preventer 115, 116 tends to press the respective valve body 122, 123 against the respective valve seat 120, 121.

[0036] An increasing pressure within the inlet chamber tends to lift up the valve body 122 of the first backflow preventer 115 from the respective valve seat 120 against the spring force provided by the respective spring element 124.

[0037] An increasing pressure within the intermediate chamber 114 tends to lift up the valve body 123 of the second backflow preventer 116 from the respective valve seat 121 against the spring force provided by the respective spring element 125.

[0038] The discharge valve 117 is closed (see Figure 2a) when the elastic element 118 is stretched. The discharge valve 117 is opened (see Figure 2b) when the elastic element 118 is un-stretched.

[0039] The inner housing part 119 divides the intermediate chamber 114 in a first sub-chamber 126 and in a second sub-chamber 127. The sub-chambers 126, 127 are connected by at least one thorough-hole 128 in the inner housing part 119. The elastic element 118 is positioned between the inner housing part 119 of the housing 111 and the outer housing part 120 of the housing 111. The pressure within the inlet chamber 112 acts on a first side of the elastic element 118. The pressure within the intermediate chamber 114 acts on a second side of the elastic element 118. At least one through hole 129 within the inner housing part 119 allows the pressure within the inlet chamber 112 to act on the first side of the elastic element 118. At least one through hole 130 within the outer housing part 120 allows to discharge the intermediate chamber 114 to the atmosphere when the discharge valve 117 is opened.

[0040] The elastic element 118 is in the shown embodiment fixedly attached to the inner housing part 119. The same is in its stretched status pressed against the outer housing part 120 thereby closing the discharge valve 117. The elastic element 118 is transferred from its un-stretched status (see Figure 2a) in its stretched status (see Figure 2b) by a pressure increase within the inlet chamber 112, whereby the pressure increase in the inlet chamber 112 acts against an elastic reset force of the elastic element 118.

[0041] The elastic reset force provided by the elastic material from which the elastic element 118 is manufactured tends to transfer the elastic element 118 back into its un-stretched status thereby opening the discharge valve 117. The elastic element 118 is preferably made from rubber or a rubber-like material.

[0042] Alternatively, it is also possible that the elastic element 118 is fixedly attached to the outer housing part 120 and that the same is in its stretched status pressed against the inner housing part 119.

[0043] The first backflow preventer 115 can only be opened by an increasing pressure in the inlet chamber 112 when the discharge valve 117 is closed. This is accomplished by adapting the elastic reset force of the elastic element 118 and the spring force of the spring element 124 is such a way that the valve body 122 of the first backflow preventer 115 can only lift up from the valve seat 120 of the first backflow preventer 115 after the elastic element 118 is transferred from its stretched status and pressed against the outer housing part 120 thereby closing the discharge valve 117.

[0044] The system disconnector 110 of Figures 2a and 2b has a simple design. The discharge valve 117 does not have a separate spring element. The elasticity of the elastic element 118 allows not to have a separate spring element

for the discharge valve 117. The system disconnector 110 of Figures 2a and 2b avoids leakage problems.

[0045] Figures 3a and 3b show a system disconnector 210 according to a third aspect of the present invention. The system disconnector 210 comprises a housing 211 defining an inlet chamber 212, an outlet chamber 213 and an intermediate chamber 214 positioned in flow direction of a liquid medium between the inlet chamber 212 and the outlet chamber 213.

[0046] The system disconnector 210 further comprises backflow preventers 215, 216 arranged in series connection in the flow of the liquid medium, namely a first backflow preventer 215 between the inlet chamber 212 and the intermediate chamber 214 and a second backflow preventer 216 between the intermediate chamber 214 and the outlet chamber 213.

[0047] When the first backflow preventer 215 is opened, the liquid medium can flow from the inlet chamber 212 into the intermediate chamber 214. The opening and closing of the first backflow preventer 215 is controlled by a pressure differential between the inlet chamber 212 and the intermediate chamber 214.

[0048] When the second backflow preventer 216 is opened, the liquid medium can flow from the intermediate chamber 214 in the outlet chamber 213. The opening and closing of the second backflow preventer 216 is controlled by a pressure differential between the intermediate chamber 214 and the outlet chamber 213.

[0049] The system disconnector 210 further comprises a discharge valve 217 adapted to discharge the intermediate chamber 214 being positioned between the first backflow preventer 215 and the second backflow preventer 216 to the atmosphere. The discharge of the intermediate chamber 214 by the discharge valve 217 is controlled by a pressure differential between the inlet chamber 222 and the intermediate chamber 214. The discharge valve 217 is also often called venting valve. In Figure 3a the discharge valve 217 is opened and in Figure 3b the discharge valve 217 is closed.

[0050] The discharge valve 217 of the disconnect protector 210 according to Figures 3a and 3b is provided by a first moveable housing insert 218. The first moveable housing insert 218 comprises a first end carrying a first valve body 220 acting together with a valve seat 221 of the discharge valve 217 provided by the housing 211.

[0051] The discharge valve 217 is closed (see Figure 3b) when the first valve body 220 of the first moveable housing insert 218 is pressed against the valve seat 221 of the housing 211. The discharge valve 217 is opened (see Figure 3a) when the first valve body 220 of the first moveable housing insert 218 is lifted up from the valve seat 221 of the housing 211.

[0052] The first backflow preventer 215 of the system disconnecter 210 is provided by the first moveable housing insert 218 in combination with a second moveable housing insert 222. The first moveable housing insert 218 further comprises a second end carrying a second valve body 223 for the first backflow preventer 215. This second valve body 223 acts together with a valve seat 224 of the first backflow preventer 215 provided by the second moveable housing insert 222. The outer diameter of the second vale body 223 of the first moveable housing insert 218 is larger than an inner diameter of an opening 225 of the second moveable housing insert 222. The opening 225 is surrounded by the valve seat 224.

[0053] The first moveable housing insert 218 is provided by a stem-like element 219 having the first end carrying the first valve body 220 and the second end carrying the second valve body 223. The second moveable housing insert 222 is provided by a tube-like element surrounding at least partially the stem-like element 219. The stem-like element 219 extends with its second end carrying the second valve body 223 for the first backflow preventer 215 through the opening 225 of the second moveable housing insert.

[0054] The first backflow preventer 215 comprises in addition to the first moveable housing insert 218 and the second moveable housing insert 222 a spring element 226. The spring element 226 provides a spring force which tends to close the first backflow preventer 215. Further on, the spring force provided by the spring element 226 tends to open the discharge valve 217. The first backflow preventer 215 and the discharge valve 217 use the common spring element 226.

[0055] When the pressure within the inlet chamber 212 increases, firstly the discharge valve 217 becomes closed by pressing the valve body 220 against the valve seat 221. The increasing pressure in the inlet chamber 212 acts against the spring force provided by the common spring element 226. Secondly, after the discharge valve 217 is closed and with further increasing pressure within the inlet chamber 212, the first back flow preventer 215 becomes opened by lifting up the valve seat 224 provided by the second moveable housing insert 222 from the valve body 223 provided by the first moveable housing insert 218. The further increasing pressure in the inlet chamber 212 also acts against the spring force provided by the common spring element 226.

[0056] The second backflow preventer 216 has a valve seat 227 acting together with a valve body 228, whereby a spring force provided by a spring element 229 of the second backflow preventer 216 tends to press the valve body 228 against the valve seat 227. An increasing pressure within the intermediate chamber 214 tends to lift up the valve body 228 from the valve seat 227 against the spring force provided by the spring element 229.

[0057] The system disconnector 210 of Figures 3a and 3b has a simple design. The discharge valve 217 does not have a separate spring element. The discharge valve 217 and the first backflow preventer 215 make use of the common spring element 226. The system disconnector 210 of Figures 3a and 3b avoids leakage problems.

[0058] List of reference signs

10 system disconnector

11 housing

12 inlet chamber

13 outlet chamber

14 intermediate chamber

15 first backflow preventer

16 second backflow preventer

17 discharge valve

18 moveable housing insert

19 non-moveable housing insert

20 valve seat

21 valve body

22 spring element

23 valve seat

24 valve body

25 spring element

26 valve body

27 valve seat

28 elastic section

29 guide element

30 cylinder-like element.

110 system disconnector

111 housing

112 inlet chamber

113 outlet chamber

114 intermediate chamber

115 first backflow preventer

116 second backflow preventer

117 discharge valve

118 elastic element

119 inner housing part

120 outer housing part

121 valve seat

122 valve seat

123 valve body

124 valve body

125 spring element

126 spring element

127 sub-chamber

128 sub-chamber

129 through hole

130 through hole

210 system disconnector

211 housing

212 inlet chamber

213 outlet chamber

214 intermediate chamber

215 first backflow preventer

216 second backflow preventer

217 discharge valve

218 first moveable housing insert

219 stem-like element

220 valve body

221 valve seat

222 second moveable housing insert

223 valve body

224 valve seat

225 opening

226 spring element

227 valve seat

228 valve body

229 spring element

Claims

1. System disconnector, comprising:

a housing (11) defining an inlet chamber (12), an outlet chamber (13) and an intermediate chamber (14) positioned in flow direction of a liquid medium between the inlet chamber (12) and the outlet chamber (13),
backflow preventers (15, 16) arranged in series connection in the flow of the liquid medium, namely a first backflow preventer (15) between the inlet chamber (12) and the intermediate chamber (14) and a second backflow preventer (16) between the intermediate chamber (14) and the outlet chamber (13),
a discharge valve (17) adapted to discharge the intermediate chamber (14) being positioned between the first backflow preventer (15) and the second backflow preventer (16) to the atmosphere which is controlled by a pressure differential between the inlet chamber (12) and the intermediate chamber (14),
characterized in that
the discharge valve (17) is provided by a moveable housing insert (18) in combination with a non-moveable housing insert (19), wherein the moveable housing insert (18) is part of the first backflow preventer (15), wherein the non-moveable housing insert (19) is part of the second backflow preventer (16), wherein the discharge valve (17) is closed when the moveable housing insert (18) is pressed against the non-moveable housing insert (19), and wherein the discharge valve (17) is opened when the moveable housing insert (18) is lifted up from the non-moveable housing insert (19).

2. System disconnector as claimed in claim 1, **characterized in that** a cylinder-like element (30) made from an elastic material is positioned between housing (11) and the moveable housing insert (18) and separates the inlet chamber (12) from the intermediate chamber (14).

3. System disconnector as claimed in claim 2, **characterized in that** the cylinder-like element (30) is stretched when the moveable housing insert (18) is pressed against the non-moveable housing insert (19), and that the cylinder-like element (30) is un-stretched when the moveable housing insert (18) is lifted up from the non-moveable housing insert (19).

4. System disconnector as claimed in claim 2 or 3, **characterized in that** the cylinder-like element (30) is fixedly attached to the moveable housing insert (18) and to the housing (11).

5. System disconnector as claimed in one of claims 1 to 4, **characterized by** a guide element (29) for guiding the movement of the moveable housing insert (18) relative to the non-moveable housing insert (19).

6. System disconnector, comprising:

a housing (111) defining an inlet chamber (112), an outlet chamber (113) and an intermediate chamber (114) positioned in flow direction of a liquid medium between the inlet chamber (112) and the outlet chamber (113),
backflow preventers (115, 116) arranged in series connection in the flow of the liquid medium, namely a first backflow preventer (115) between the inlet chamber (112) and the intermediate chamber (114) and a second backflow preventer (116) between the intermediate chamber and the outlet chamber,
a discharge valve (117) adapted to discharge the intermediate chamber (114) being positioned between the first backflow preventer (115) and the second backflow preventer (116) to the atmosphere which is controlled by a pressure differential between the inlet chamber (112) and the intermediate chamber (114),
characterized in that
the discharge valve (117) is provided by an elastic element (118) being positioned between an inner housing part (119) of the housing and an outer housing part (120) of the housing, wherein the inner housing part (119) is part of the first backflow preventer (115) and the second backflow preventer (116), wherein the discharge valve (117) is closed when the elastic element (118) is stretched, and wherein the discharge valve (117) is opened when the elastic element (118) is un-stretched.

7. System disconnector as claimed in claim 6, **characterized in that** the elastic element (118) is fixedly attached the inner housing part (119) or alternatively to the outer housing part, and that the same is in its stretched status pressed against the outer housing part (120) or alternatively the outer housing part.

8. System disconnector as claimed in claims 6 or 7, **characterized in that** the elastic element (118) is made from rubber or a rubber-like material.

9. System disconnector, comprising:

a housing (211) defining an inlet chamber (212), an outlet chamber (213) and an intermediate chamber (214) positioned in flow direction of a liquid medium between the inlet chamber (212) and the outlet chamber (213), backflow preventers (215, 216) arranged in series connection in the flow of the liquid medium, namely a first backflow preventer (215) between the inlet chamber (212) and the intermediate chamber (214) and a second backflow preventer (216) between the intermediate chamber and the outlet chamber,
a discharge valve (217) adapted to discharge the intermediate chamber (214) being positioned between the first backflow preventer (215) and the second backflow preventer (216) to the atmosphere which is controlled by a pressure differential between the inlet chamber and the intermediate chamber,
characterized in that
the discharge valve (217) is provided by a first moveable housing insert (218), and that the first backflow preventer (215) is provided by the first moveable housing insert (218) in combination with a second moveable housing insert (222), wherein the discharge valve (217) is closed when the first moveable housing insert (218) is pressed against the housing.

10. System disconnector as claimed in claim 9, **characterized in that** the first moveable housing insert (218) has a first end acting together with a valve seat (221) of the discharge valve (217), wherein the valve seat (221) of the discharge valve (217) is provided by the housing (211), and that the first moveable housing insert (218) has a second end acting together with a valve seat (224) of the first backflow preventer (215), wherein the valve seat (224) of the first backflow preventer (215) is provided by the second moveable housing insert (222).

11. System disconnector as claimed in claim 9 or 10, **characterized in that** the first moveable housing insert (218) is provided by a stem-like element (219) having the first end carrying a first valve body (220) for the discharge valve (217) and the second end carrying a second valve body (223) for the first backflow preventer (215).

12. System disconnector as claimed in claim 12, **characterized in that** that the second moveable housing insert (222) is provided by a tube-like element surrounding at least partially the stem-like element (219).

13. System disconnector as claimed in claim 11 or 12, **characterized in that** the outer diameter of the second valve body (223) of the first moveable housing insert (218) is larger than an inner diameter of an opening (225) of the second moveable housing insert (222), wherein stem-like element (219) extends with its second end carrying the second valve body (223) for the first backflow preventer (215) through the opening (225) of the second moveable housing insert (222).

14. System disconnector as claimed in one of claims 9 to 13, **characterized in that** the discharge valve (217) and the first backflow preventer (215) use a common spring element (226).

15. System disconnector as claimed in one of claims 1 to 14, **characterized in that** the first backflow preventer (15, 115, 215) can only be opened when the discharge valve (17, 117, 217) is closed.

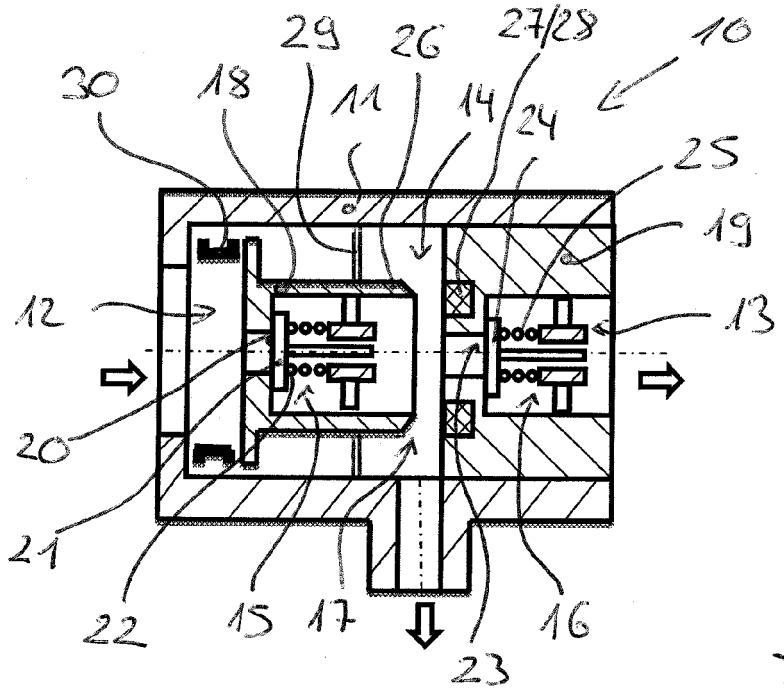
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Fig.1a

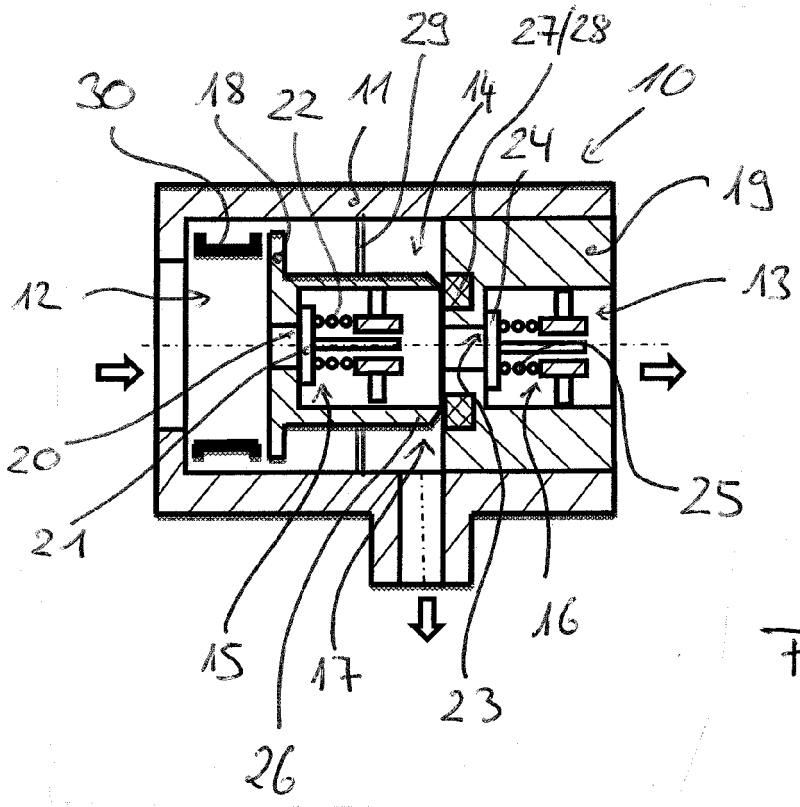
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Fig.1b

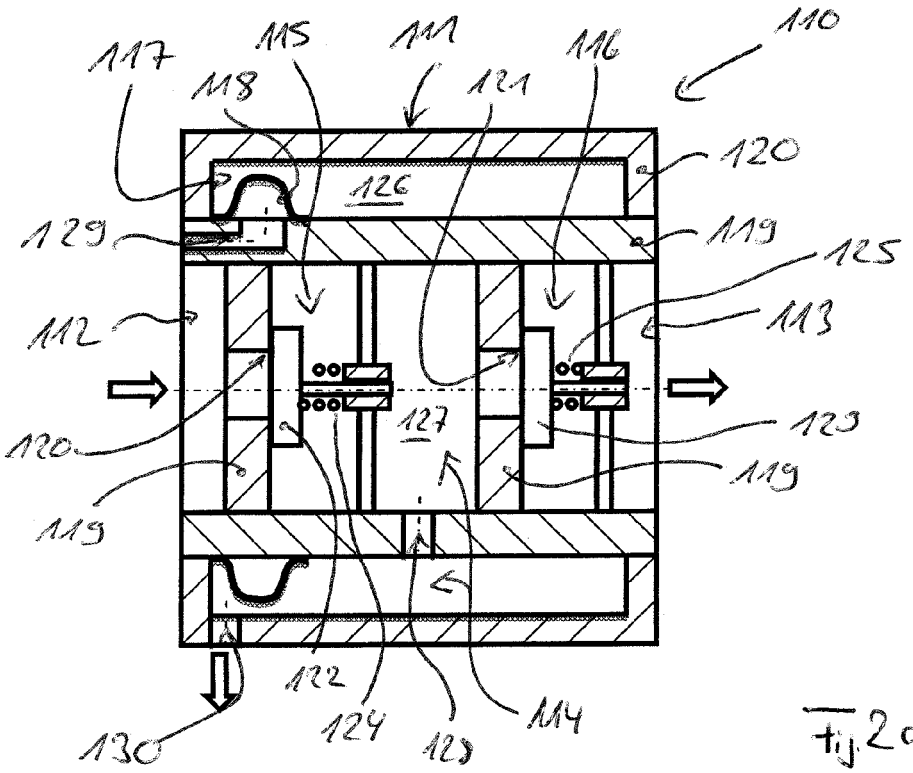
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Fig. 2a

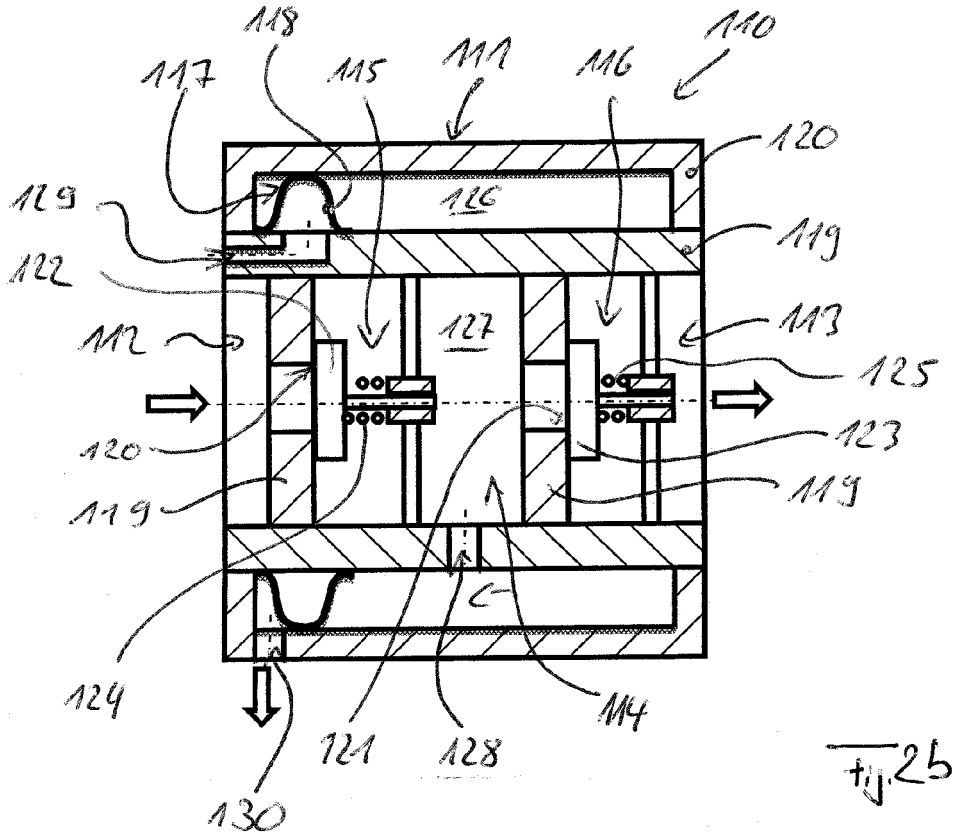
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Fig. 2b

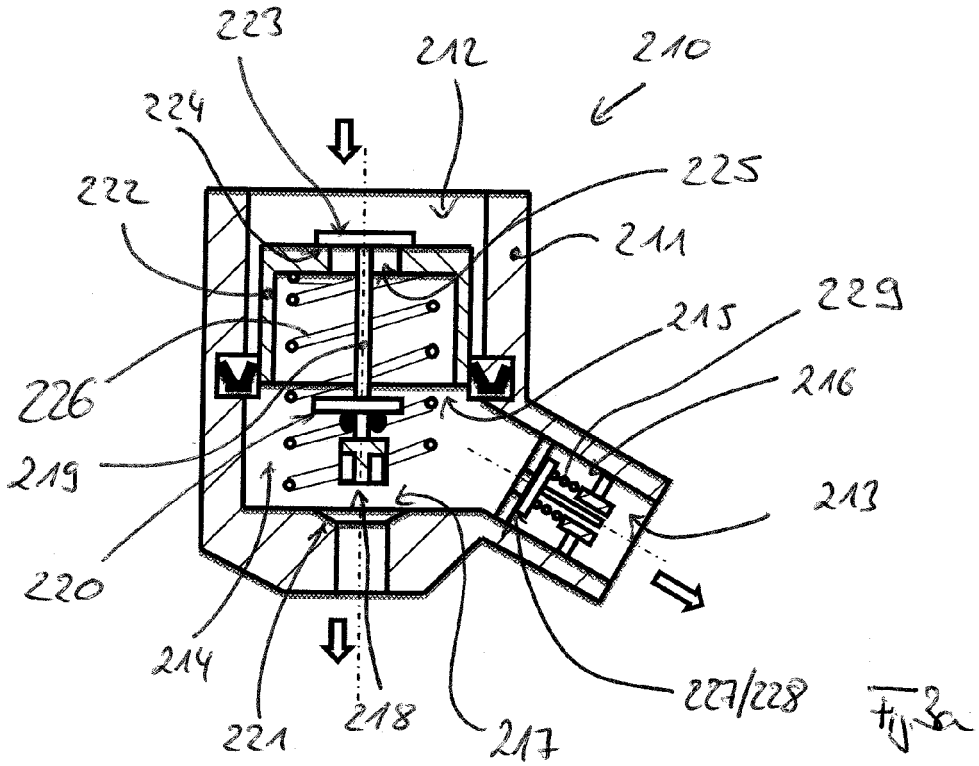
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Fig. 3a

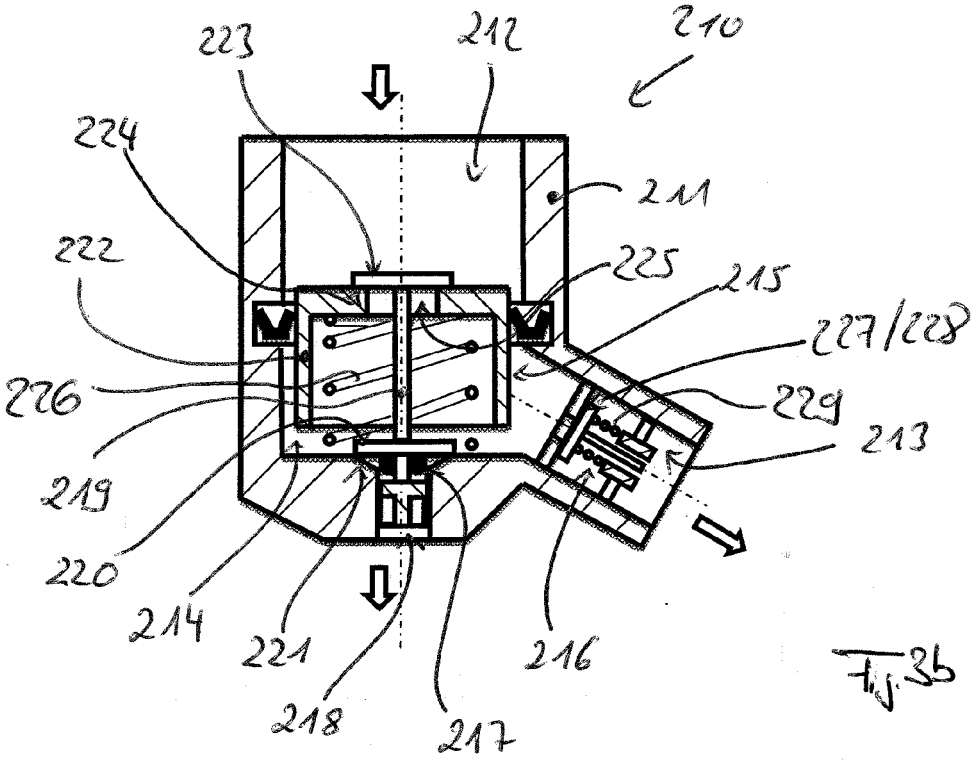
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Fig. 3b

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EUROPEAN SEARCH REPORT

Application Number
EP 12 15 1515

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 004 715 A1 (VOLLMER INGENIEURBUERO [DE]) 31 May 2000 (2000-05-31) * the whole document *	1-4	INV. E03C1/10
X Y	EP 1 350 896 A2 (SASSERATH & CO KG H [DE]) 8 October 2003 (2003-10-08) * figures 2,3 *	1 2-4	
Y	DE 37 08 169 A1 (LICENTIA GMBH [DE]) 22 September 1988 (1988-09-22) * figure 1 *	2-4	
			TECHNICAL FIELDS SEARCHED (IPC)
			E03C

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
Munich	15 June 2012	Geisenhofer, Michael

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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T : theory or principle underlying the invention
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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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Application Number
EP 12 15 1515

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-4

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 12 15 1515

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-4

cylinder-like element
STF: elastic material, stretched/unstretched when housing moves, attached to housing and moveable housing insert

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2. claim: 5

guide element
STF: suitable for guiding movement of the moveable housing insert relative to the non-movable housing insert

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 15 1515

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15-06-2012

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EP 1350896 A2	08-10-2003	AT 324499 T	15-05-2006
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 0555837 B1 **[0002]**